

REMARKS

Claims 1-15 are now pending in the application. The amendments to the claims contained herein are of equivalent scope as originally filed and, thus, are not a narrowing amendment. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 102

Claims 1 and 8 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Morris et al. (U.S. Pat. No. 5,060,276 A, hereinafter "Morris"). This rejection is respectfully traversed.

At the outset, claim 1 has been amended to clarify that the plurality of images are "of an object, wherein each of the library images depicts the object in a different orientation." Claim 1 has also been amended to include the use "of said object images to determine a maximum match score for each of said library images, to thus determine which one of said library images at least substantially matches an orientation of said object."

The Examiner has stated that Morris discloses providing a plurality of library images each having a predetermined orientation. Applicants believe that the amendment to claim 1 even more clearly distinguishes the present invention from Morris. Morris discloses a library of images used as a footprint, "such as a chip relative to a board onto which it is assembled" (col. 3, lines 35-36). With the system of Morris, it appears that a separate marking, or a separate component placed directly on the object whose orientation needs to be discerned, is required. The preferred embodiments of the

present invention provide for determination of the orientation (i.e., attitude) of an object by itself, without requiring a reference or footprint image being placed on the object. The present invention also allows for attitude detection of an object to be rotated in any direction, and further for three-dimensional rotation.

The method disclosed by Morris would not seem to work properly if an object is rotated in any direction, because the reference mark on the object may become hidden from the view of the apparatus. Therefore, Applicants believe that Morris, at best, limits the visual orientation detection of an object to conditions where object rotation is occurring about a single axis. If an object were rotated in three dimensions, such that the chip mentioned in Morris was hidden from view from the detection apparatus, the system in Morris would seemingly be unable to provide object orientation detection. More particularly, the one-dimensional rotation in Morris appears to be limited to rotation about an axis generally normal to a surface containing a chip or other marking. Applicants therefore believe that the footprint scheme used in Morris limits detection to those situations where object rotation is occurring in only one dimension. As a result, Morris appears to limit the determination of the orientation of an object to only "up", "down", or "indeterminate" (col. 5, lines 13-14 and col. 8, lines 39-40).

The present invention essentially provides a much greater degree of orientation detection of an object. Based on the library images available, the present invention makes at least a two-dimensional determination of the actual attitude of an object. Thus, the present invention discloses a method for determining object attitude that does not appear to be taught or suggested by Morris. Therefore, claim 1 should be in condition for allowance.

Applicants note that claim 8 has been amended to correct an informality. Applicants further note that claim 8 depends from claim 1 and as such, should be in condition for allowance for the reasons set forth for claim 1. The Examiner is respectfully requested to withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 103

Claims 2, 9 and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Morris et al. (U.S. Pat. No. 5,060,276 A, hereinafter Morris) in view of Zhou et al. (U.S. Pat. No. 6,327,388 B1, hereinafter Zhou). Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Morris in view of Zlotnick (U.S. Pat. No. 6,778,703 B1, hereinafter Zlotnick). Claims 5, 6 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Morris in view of Avinash (U.S. Pat. No. 6,757,442 B1, hereinafter Avinash). These rejections are respectfully traversed.

At the outset, Applicants note that claims 2-7 depend from claim 1. As such these claims should be in condition for allowance for the reasons set forth above for claim 1.

The Examiner has rejected claim 9 for the reasons set forth regarding claims 1 and 2. Applicants have therefore amended claim 9 to clarify that the plurality of images are “of an object, wherein each of the library images depicts the object in a different orientation.” Claim 9 has also been amended to include the use “of said object images to determine a match score for each of said library images, to thus determine which one of said library images at least substantially matches an orientation of said object.” These amendments are similar to those made in claim 1. As such, Applicants believe that the

amendment to claim 9 distinguishes the present invention from Morris for the reasons set forth above regarding claim 1.

Applicants note that claim 15 has been amended to correct an informality. Applicants further note that claims 10-15 depend from claim 9 and as such, should be in condition for allowance. The Examiner is respectfully requested to withdraw the rejections in view of the amendments and remarks contained herein.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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AMENDMENTS TO THE DRAWINGS

The attached formalized "Replacement Sheets," which include Figures 8a, 8b and 8c, replace the original sheets including Figures 8a, 8b and 8c.